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STUDY OF AN OUTBREAK OF SEPTIC SORE THROAT OCCURRING IN CONCORD (N.H.), JANUARY, 1912.*

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Epidemics of tonsilitis or "septic sore throat," other than those due to Klebs-Loeffler bacillus of diphtheria, have not until recent years attracted much attention in this country. In May, 1911, there was an epidemic in Boston which was studied by Winslow[1] and the Massachusetts Board of Health.[2] Seven epidemics of sore throat due to milk, all of which occurred in Europe, are reported by Rosenau.[3]

In December, 1911, Chicago was visited by an epidemic of sore throat, which was studied by Capps and Miller,[4] in relation to the milk supply. Wm. P. Coues,[5] made studies of an outbreak of sore throat infections which occurred in Boston in February, 1912, in which practically 45 per cent used milk from the same dairy. Besides the seven epidemics reported by Rosenau, W. S. Savage[6] has reported twelve milk-borne outbreaks in the British Isles and one in Christiania. All of these outbreaks occurred between 1880 and 1908.

It is very probable that outbreaks of sore throat other than the ones referred to, have occurred in this country, but on account of the difficulties attached to thorough epidemiological investigations they have been left to take care of themselves. Such studies, however, are very important, both to the general public and to physicians and investigators. Boards of Health and other authorities should spare no expense in encouraging such studies. The people are concerned because they must bear the brunt of the burden when epidemics occur and because they must carry out

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[1] *Jour. Infect. Dis.*, 1911, 8, p. 259; *Boston Med. and Surg. Jour.*, 1911, 165, p. 899.

[2] *Bull. No. 12*, Mass. Board of Health, 1912, 7.

[3] *Bull. No. 56*, Hyg. Lab., U.S. Pub. Health and Mar.-Hosp. Serv., Wash., 1909.

[4] *Jour. Am. Med. Assn.*, 1912, 58, p. 1848.

[5] *Am. Jour. Pub. Health*, 1912, 2, p. 419.

[6] *Milk and the Public Health*, 1912.

preventive measures. Medical men and scientific workers should be interested because such investigations may suggest the possibility of finding the transmitting agents, heretofore more or less obscure, of certain diseases occurring in epidemic form. As medicine develops more and more along rational lines, we can see more clearly how to proceed in studying measures of prevention.

It has not been very long since malarial fever was thought to be transmitted through the miasm of marshy, damp regions. Malarial districts were looked upon as made by nature and the prevention of the disease, except by the use of quinine, was not dreamed of. Now we know that the atmosphere has nothing to do with malaria, and marshy regions are concerned only so far as they afford breeding places for the Anopheles mosquito. As with malarial fever, so it may be with the transmission of most other diseases heretofore attributed to the air.

The study of the recent epidemic of sore throat in Concord impressed upon the writer how deep-rooted in the public is the idea that such outbreaks are due to atmospheric conditions. Even medical men are too often satisfied with this explanation, thus encouraging a public indifference that is akin to fatalism. It is reasonable to suppose that a room, carpeted and filled with upholstered furniture and objects that can easily catch dust, may become a source of danger in the presence of any disease, the causative agent of which is thrown off through the mouth and nasal passages. It is hardly probable, however, that any disease organism so thrown off can pervade the whole atmosphere and cause an epidemic.

The study of the outbreak of sore throat in Concord in January, 1912, was made, however, with a view of the following possible causative agents of transmission: air, water, contact, and food.

Air.—Concord, the capital city of New Hampshire, has 22,000 inhabitants. There are not many foreigners and a composite picture of the citizens would be much above the average. The outbreak began rather suddenly about January 1. Although it is said to have been very dusty before this date, the snow covered the ground January 4. Sleighing began at this time and continued

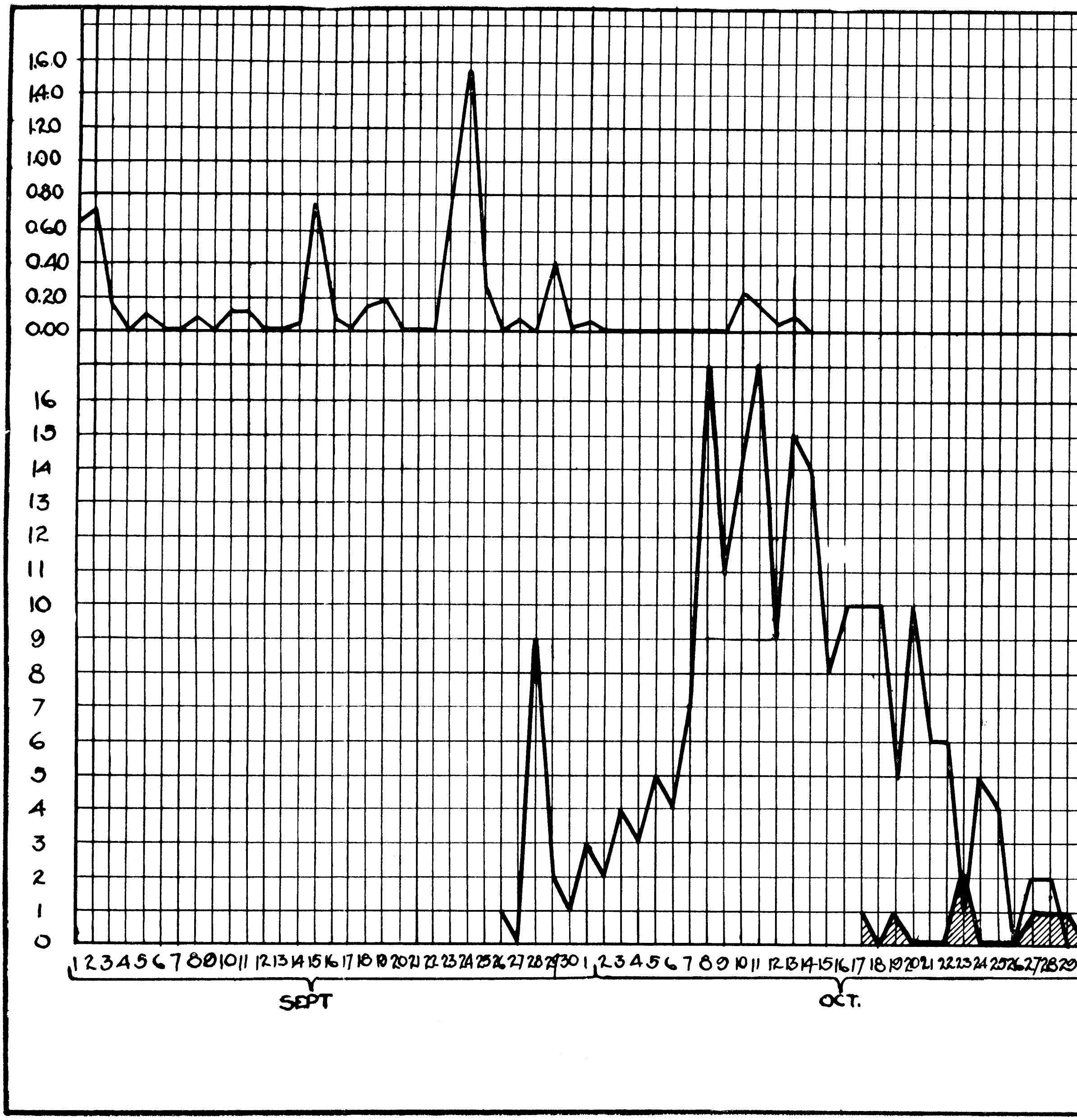
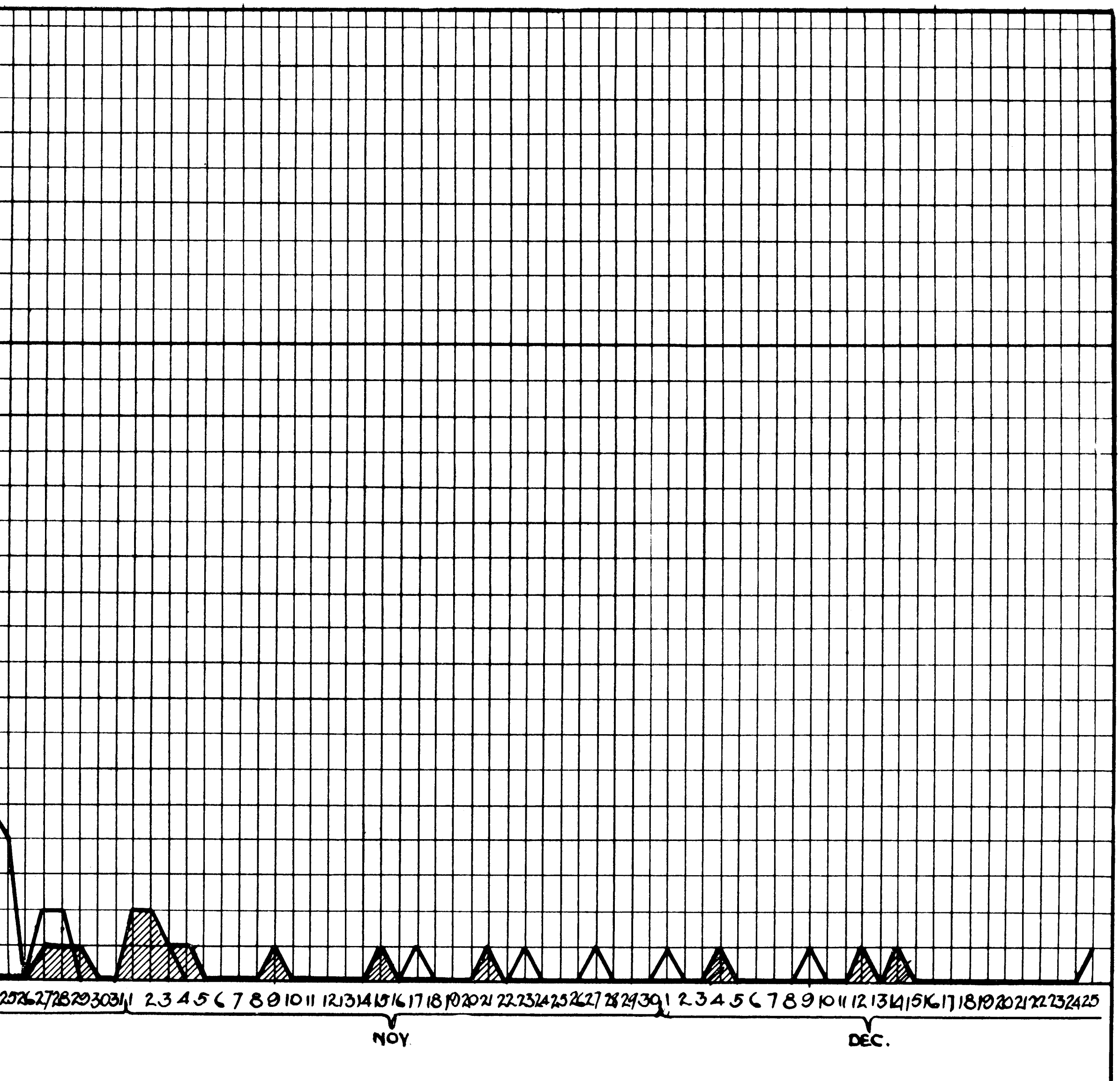


FIG. 6.—The upper curve shows the average precipitation in inches taken at four points of the compass and within a radius of 25 miles from Tro



iles from Troy Borough. The lower curve shows the morbidity in relation to the precipitation curve. The shaded areas record the mortality.

until March. Throughout this period there was practically no dust flying in the air. The disease was generally distributed throughout the city as shown in Map 1. It also prevailed at St. Paul's School, which is situated about two miles from the city limits. In the State Hospital for Insane, with over 950 inmates, not one was affected with sore throat. At Margaret Pillsbury Hospital the writer was told by the head nurse that during January practically every person, including both patients and attendants, was more or less affected with sore throat. At the Woman's Memorial Hospital, situated in the same part of the city, not a single case occurred, except one that was brought there as a patient. The matron told the writer, however, that when the case was admitted she was very uneasy and feared a general outbreak similar to the one at Margaret Pillsbury Hospital. At St. Mary's School, 25 cases among 50 persons occurred between January 12 and 28. At Rolfe and Rumford Asylum for children no cases occurred among 20 inmates. In the face of this evidence it seems that some medium other than the air was at fault in the transmission of the epidemic, or some of the 950 inmates of the State Hospital for Insane would probably have been affected. Some institutions would not have suffered so severely while others of like nature remained entirely free from the disease, since all were situated in the same part of the city.

Water.—The same facts that seem to eliminate the air can also be applied to eliminate the drinking-water. All of the above named institutions except St. Paul's used the same water supply. Records of the analyses also showed good water.

Contact.—The sharp outbreak of the disease as shown in Chart No. 1 indicates that some other medium of transmission was at work than the casual contact of one person with another. At St. Mary's school the girls came back from the holidays on the 8th. They began to get sick on the 12th without having come in contact, so far as they knew, with the disease. In Margaret Pillsbury Hospital, patients who had been in bed for weeks with some other trouble, suddenly became sick with sore throat. At St. Paul's School the boys returned from all parts of the country on January 10. In the different schools, Upper, Main, and Lower, they began to get sick about the same time without having come in contact with one another.

Another interesting fact was the comparative freedom from the disease among the public-school children. There was ample opportunity for the disease to spread by contact among them, for several admitted to the writer that they attended school with the disease. These cases had no physicians and are not included in the general record, but from the description given it is safe to conclude that they were affected with the "septic sore throat" that prevailed at the time.

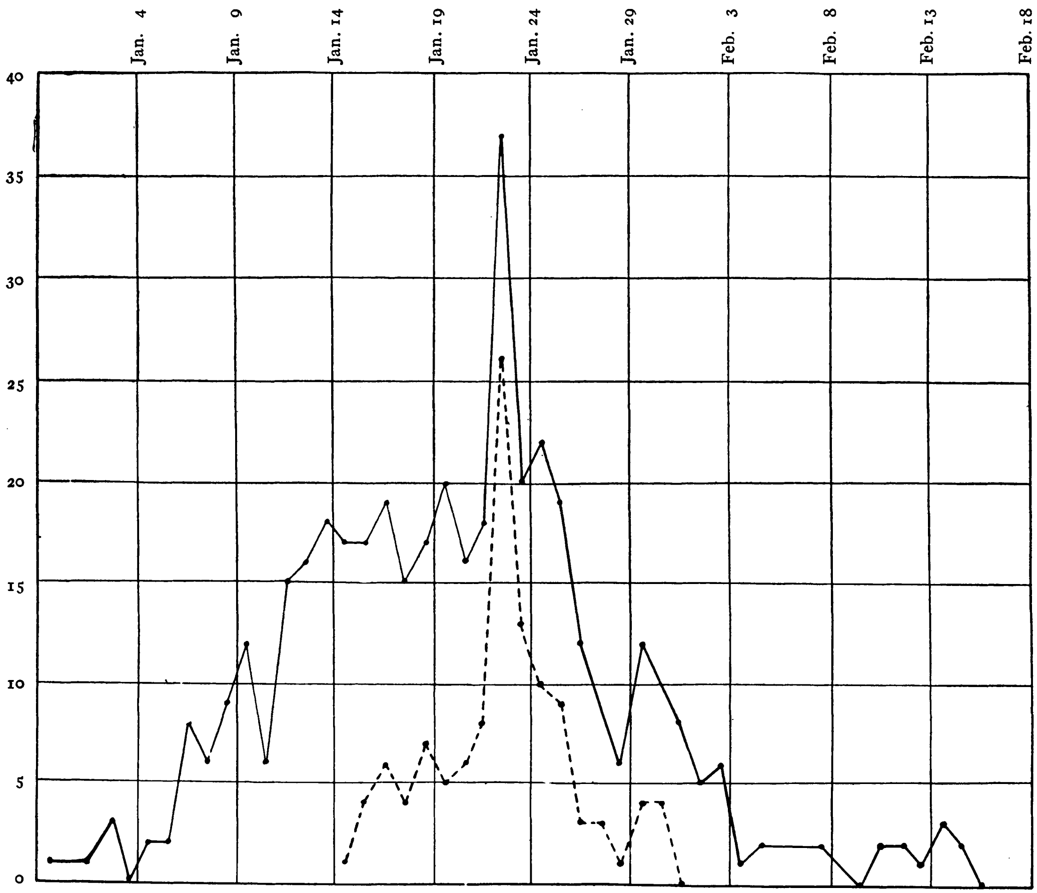


CHART 1.—Showing outbreak of 426 cases of "septic sore throat" in Concord, N.H., January and February, 1912. Dotted lines indicate outbreak at St. Paul's School.

If contact had been the means of the spread, why did it affect St. Paul's School and also St. Mary's where fifty persons were attacked, and not the different schools of the city where a few were known to have attended with the disease? These complications in connection with the rather sharp outbreak which died out in about six weeks, point to some other cause of transmission.

TABLE 1.

NUMBER OF CASES REPORTED DAILY.

Date	Number Reported	Date	Number Reported	Date	Number Reported
Dec. 30, 1911	1	Jan. 16	14	Feb. 1	9
Jan. 1, 1912	1	" 17	16	" 2	3
" 2	1	" 18	16	" 3	6
" 3	4	" 19	14	" 4	1
" 4	0	" 20	21	" 5	2
" 5	2	" 21	15	" 6	2
" 6	3	" 22	17	" 7	2
" 7	8	" 23	36	" 8	1
" 8	6	" 24	19	" 9	1
" 9	9	" 25	21	" 10	0
" 10	15	" 26	18	" 11	1
" 11	6	" 27	12	" 12	2
" 12	12	" 28	7	" 13	1
" 13	15	" 29	6	" 14	3
" 14	16	" 30	10	" 15	1
" 15	16	" 31	8		

Food.—Investigating the food, it was soon noticed that there was a relation between the incidence of the disease and the use of cream and milk from one dairy. Inquiry in relation to foods other than milk and cream showed nothing. At St. Paul's School where 121 cases occurred, and at Margaret Pillsbury Hospital where 100 per cent were more or less affected, no connection with any particular food except the milk and cream was discovered. At first even the milk-supply did not seem to be involved. The writer was told that St. Paul's had its own model dairy. He was told that Margaret Pillsbury Hospital received its milk from one dairy and St. Mary's from another. Individuals in the city gave the same information when asked concerning their milk. Inquiry regarding the cream, however, showed a very suspicious relation to the outbreak. So generally distributed was the disease among the different milk routes, that the local authorities had almost decided that the milk was not at fault. Newspaper articles appeared, stating that the milk was not the cause. Upon further inquiry, it was found that St. Paul's School, besides its regular home-produced milk, used cream from a dealer who supplied daily about 150 quarts of cream and 300 quarts of milk to the city of Concord. The Margaret Pillsbury Hospital used the same cream and St. Mary's School used this dealer's milk. Persons in the city who had been attacked also used this cream. Suspicion that the cream and milk from the dairy in question were chiefly responsible for the transmission of the epidemic, was strengthened when it was found that the State Hospital for the Insane, the Woman's Memorial and Rolfe and Rumford Asylum, in which institutions no cases developed, did not use either milk or cream from the suspected dairy. Upon this evidence the writer decided to make a more thorough investigation of the milk and cream supply in relation to the outbreak of sore throat.

TABLE 2.

CREAM SUPPLY TO ST. PAUL'S SCHOOL.

Date	Upper	Main	Lower	Remarks
January 11	10 qts.	8 qts.	4 qts.	Upper school for large boys. Main school for middle boys. Lower school for small boys.
January 15	5 "	..	4 "	For ice cream.
January 17	..	4 "	..	For ice cream.
January 20	5 "	4 "	4 "	For cream dessert.
January 22	5 "	..	4 "	For ice cream.
January 24	..	4 "	..	For ice cream.
January 27	10 "	8 "	4 "	For cream dessert.

CREAM SUPPLY FURNISHED BY THE BOYS.

Date	Upper	Main	Lower	Remarks
January 13	16 "	8 "	20 "	Cream supplied by boys used mostly on cereals.
January 20	16 "	16 "	20 "	
January 27	14 "	14 "	20 "	Three quarts were delivered daily to the Upper School.

The epidemic as shown in Chart 1 lasted from January 1 to February 15. That a few cases appeared after this date is not surprising, when we take into consideration the fact that nothing was done to cut off the source of trouble. A study of conditions will show why a gradual rather than a rapid decline in the incidence curve would be expected. Dairy conditions around Concord were such that it was not unlikely that other supplies could easily have become involved after so many persons had had the disease.

It stands to reason that as soon as the cases on the farms supplying the suspected dairy and the cases at the suspected dairy itself, convalesced, the outbreak would die down. The outbreak at St. Paul's School seemed to be sharper than in the city. The figures of the number sick were kindly furnished by the school physician, Dr. Walker. Unfortunately the writer was not able to make inquiries among the students, regarding the number affected after January 29, who did not ask for medical attention. The writer's investigations in Concord began on February 12 and ended about March 15. The authorities in the school, because they did not wish to bring the subject before the boys again, preferred to have the matter dropped. Argument that the findings might be of great public interest availed nothing. The writer was thus unable to make as thorough a study in St. Paul's School as he wished. It is unfortunate that heads of many of our institutions of learning do not seem to realize the importance of more careful attention to the questions which affect the public health. The authorities, it seems, should have encouraged every effort to find out the cause of the disease that brought down 10, 15 and 20 boys a day. It is just such indifference that has caused the needless sacrifice of so many lives in this country.

Since the disease was not a reportable one, none of the cases had been reported to the local health department. In the absence of public records it was necessary to depend on the local physicians for all records. A card similar to the following was distributed among them.

No................
Name................Street............Age..............Sex........
Occupation................Date when sickness began..................
No. in family..........How many in family were affected..............
Interval in cases in same family............Butter supply..............
Was water other than city water used?................Cream supply....
Name of dairyman................Name of grocer....................
Fruit supply..
Type and complications of disease.................................
....
Name of Physician..........................

The physicians very kindly gave the name, address, age, sex, and date when sickness began. The cards were then called for by the writer and the other data were obtained by direct communication with the families. In this way records of over 400 cases were secured. Unfortunately one or two physicians were not interested and would not give any data. One did not consider it giving his patients a "fair deal to furnish their names and addresses." Another was always "too busy" and informed the writer that he did not "take much stock in the cream theory, anyway." This was after a few days' pointed inquiry had naturally started rumors regarding the cream supply. With these exceptions the physicians were very co-operative. Their influence among the people was such that in no instance was the writer refused the desired information. It will be safe to say that the records in this paper cover 75 per cent of the cases that employed physicians. Although no figures are available to show the number of persons who did not seek medical attention, although suffering from the disease, there were probably several hundred. It is a conservative estimate to say that at least 1,000 persons in the city were attacked between January 1 and February 15.

Dairy conditions.—The dairy conditions of Concord, New Hampshire, compare favorably with conditions in Massachusetts except as regards the handling of the milk in the milk rooms. In Massachusetts the milk is handled in milk rooms removed from the kitchen. On the farms supplying Concord the milk is generally handled in the kitchen. The cans are usually washed in the kitchen. As a rule no means of sterilizing the cans exist. The barns are of the typical New England type, built for warmth at a sacrifice of light and fresh air. In some cases cement floors were found and these as a rule were fairly clean. In most cases, however, the floors were dirty and showed that the manure was not regularly removed. The cows were in some cases clean and showed that they were regularly curried. In others the manure was caked on their hind quarters.

The investigations on the farms were made in company with Dr. A. H. Rose of the Massachusetts State Board of Health, who was in Concord investigating for his Board as a safeguard against trouble in Massachusetts. The following evidence in regard to the disease on the farms has the advantage of having been taken by two persons. The amount of milk credited to the dairymen, and also to the dealers in another part of the paper, is only approximate.

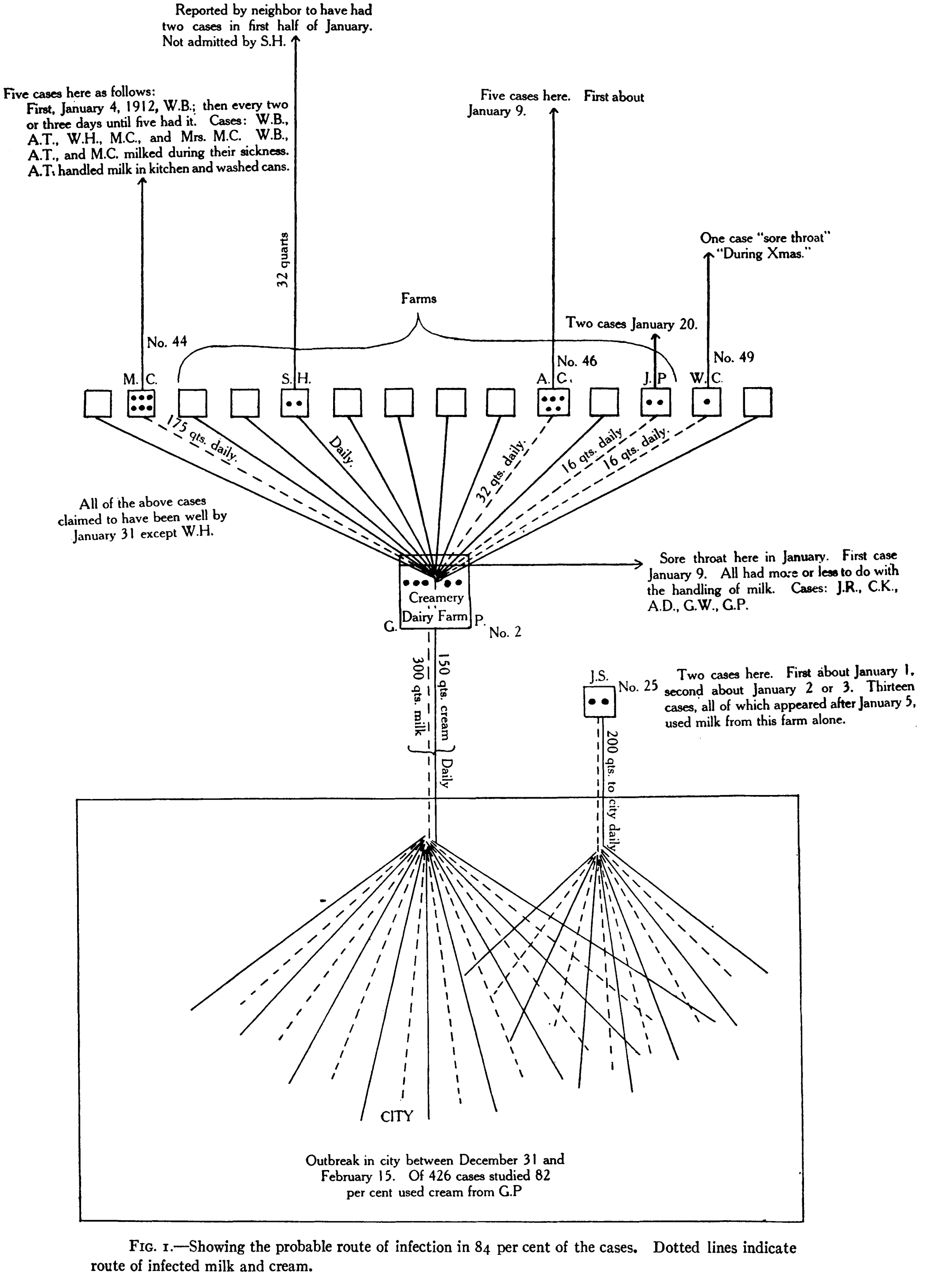

Reported by neighbor to have had two cases in first half of January. Not admitted by S.H.
Five cases here as follows: First, January 4, 1912, W.B.; then every two or three days until five had it. Cases: W.B., A.T., W.H., M.C., and Mrs. M.C. W.B., A.T., and M.C. milked during their sickness. A.T. handled milk in kitchen and washed cans.
Five cases here. First about January 9.
One case "sore throat" "During Xmas."
32 quarts
Farms
Two cases January 20.
No. 44
No. 46
No. 49
M. C.
S. H.
A. C.
J. P
W. C.
175 qts. daily.
Daily.
32 qts. daily.
16 qts. daily.
16 qts. daily.
All of the above cases claimed to have been well by January 31 except W.H.
Sore throat here in January. First case January 9. All had more or less to do with the handling of milk. Cases: J.R., C.K., A.D., G.W., G.P.
Creamery Dairy Farm
G. P.
No. 2
300 qts. milk
150 qts. cream
Daily
J.S.
No. 25
Two cases here. First about January 1, second about January 2 or 3. Thirteen cases, all of which appeared after January 5, used milk from this farm alone.
200 qts. to city daily.
CITY
Outbreak in city between December 31 and February 15. Of 426 cases studied 82 per cent used cream from G.P

FIG. 1.—Showing the probable route of infection in 84 per cent of the cases. Dotted lines indicate route of infected milk and cream.

Dairy No. 25, J.W.S., retailer, 28 cows. Daily milk supply, 200 quarts. Mrs. J.W.S. was sick about January 1. "Bronchitis and sore glands in the neck." A little girl was also sick here about January 2 or 3. Milk cans were found in the kitchen giving evidence that they were washed there.

Dairy No. 37, J.F.H., wholesaler, 17 cows. Daily milk supply, 85 quarts, to Webber. At this place was found Mrs. M.A.S., who claimed to be getting over an attack of sore throat. The cervical glands were enlarged and there was a slight redness of the throat. She was taken sick February 8 while in the city and had boarded at a restaurant that had cream from the suspected dairy. Cans were found at the entrance of the kitchen. Mrs. M.A.S. was a visitor and claimed not to have anything to do with the milk.

Farm No. 45, S.A.H., wholesaler, 7 cows. Daily milk supply, 33 quarts. Milk sold to Putnam. About January 8, two young boys had sore throat at this farm. The cans were washed and the milk handled in the kitchen.

Farm No. 46, A.A.G., wholesaler, 5 cows. Daily milk supply, 22 quarts. Milk sold to Putnam. During January there were five cases of sore throat at this farm, four children and the father. The first case occurred about January 9, and the others appeared every day or two in succession.

Farm No. 44, M.C., wholesaler, 27 cows. Daily milk supply, 175 quarts. Milk sold to Putnam. The milk was handled on a shelf back of the cows and cooled in tubs in the yard. The cans were washed in the kitchen. There were five cases of sore throat here as follows: W.B., the first case, January 4; W.H., the second case, who was affected until the middle of February; A.T., the third case; M.C., the fourth case; Mrs. M.C., the fifth case. W.B., A.T., and M.C. milked the cows during their sickness. A.T. washed the cans and handled the milk in the kitchen.

Farm No. 49, W.G., wholesaler, 2 cows. Daily milk supply, 16 quarts, to Putnam. W.G. said: "I had tonsilitis about Christmas, but was not bothered much." He handled his own milk.

Farm No. 2, G.A.P., 32 cows. This dealer also bought milk from the surrounding country. His average daily supply in milk was 300 quarts; cream, 150 quarts. This dairy was well ventilated and the cows were apparently in good physical condition. A milk room, adjoining the kitchen, was fitted, however, with an independent heating outfit. There were large stationary wooden tubs for cleaning the bottles and cans. On one end of the tub stand was an iron pipe extending up about six inches. It was customary to invert cans over this and submit them to live steam. This was the only sterilizing apparatus found. In the milk room was a cream separator. On the day of the writer's visit the separator was clean from a standpoint of domestic cleanliness, but although the detachable parts had not been sterilized, they were placed ready for future use.

From the facts elicited in connection with this dairy there is no doubt that directly and indirectly it was responsible for much of the trouble in the city. The milk brought in from surrounding farms was separated and the cream was delivered to dealers in Concord. At several of these farms undoubted evidence of sore throat was found. Persons admitted having had the disease in January.

They admitted that other members of their families had had it and while sick had worked around the cows and milk. At G.A.P.'s dairy also there were five cases. The first started about January 9. One person that worked in this dairy admitted that his neck was quite sore, but said he did not think the trouble was serious and did not have a physician. Throughout his entire sickness he worked in the dairy separating the milk and washing the cans.

Only those dairies to which cases of sore throat could be traced, are included in this report. The conditions and methods of all the dairies examined were similar to the ones mentioned.

TABLE 3.

PERCENTAGE OF MILK SUPPLIED BY DEALERS AND ALSO PERCENTAGE OF CASES ON EACH DEALER'S ROUTE.

NAME	PERCENTAGE		
	Amount of Milk	Including Putnam's Cream	Not Including Putnam's Cream
Abb	2.3	4.6	0.4
All	2.3	0.0	0.0
Ann	2.1	1.4	0.4
Bad	1.2	1.0	0.2
Bal	3.0	2.1	0.8
Buc	3.0	3.3	1.3
Bar	9.0	6.1	2.0
Bro	1.2	0.6	0.0
Cha	0.4	0.8	0.4
Cha	0.4	0.8	0.4
Che	0.5	1.0	0.4
Cie	2.8	1.0	0.8
Cla	0.5	0.0	0.0
Clo	2.1	0.8	0.4
Cha	0.4	0.8	0.4
Eme	1.1	0.2	0.0
Eas	2.3	2.3	0.0
Fie	6.1	4.2	1.6
Faw	2.3	4.4	0.8
Hig	0.8	0.0	0.0
Hil	3.0	2.1	0.2
Hil	0.5	5.8	0.2
Jon	1.0	0.2	0.0
Jor	2.3	6.7	0.0
Kim	2.0	1.4	0.0
Lam	0.1	0.0	0.0
May	2.2	1.6	0.0
Pot	2.3	0.4	0.0
Pot	1.8	0.4	0.0
Put	14.0	82.0	82.0
San	1.8	0.4	0.4
San	2.3	7.8	2.9
Sar	1.8	0.8	0.4
Sim	3.0	2.7	0.4
Spo	1.3	1.0	0.4
Ten	2.8	0.6	0.0
Ven	1.4	0.4	0.2
Web	4.1	3.0	1.2
Whi	1.4	0.2	0.2
Unknown	10.0	1.0	1.0

TABLE 4.

FIFTY FAMILIES STUDIED IN RELATION TO THE DISEASE AND THE MILK SUPPLY.

Number of Family	Number in Family	Number Sick	Milk Supply	Cream Supply	Remarks
1	7	1 (?)	C. Jones	......	Mr. A says he had sore throat one day in January, but had no physician.
2	4	0	Barnard & Dunn	......	
3	3	2	Badger	Putnam	Cases in March.
4	5	1 (?)	Own milk and cream	......	Mrs. B. says she had a slight sore throat in January, but had no doctor.
5	4	1	Abbott	Putnam	
6	3	0	Own milk and cream	......	
7	15	3	....	Putnam now and then	This is a boarding-house.
8	3	0	Pettimore (one cow)	......	
9	4	0	Cilley	......	
10	4	0	Cilley	......	
11	3	1	Barnard & Dunn	Whittier	Patient ate at restaurants also before sickness.
12	4	0	Field	......	
13	5	0	C. Potter	......	
14	8	0	Clough		
15	4	2	C. Jones	Putnam now and then	
16	4	0	Fowler	......	
17	2	0	Webber	Webber; occasionally from Putnam	
18	4	0	Fowler	......	
19	2	0	Own milk	......	
20	2	2	Fowler	Putnam	
21	2	1	Webber	Putnam	
22	3	0	Own milk and cream	......	
23	5	0	Hillman	......	
24	2	1	Putnam	Putnam	
25	2	1	J. W. Sanborn	Putnam once a week	
26	5	0	Tenney	Putnam once or twice during January	
29	4	1	Fowler	Putnam	
30	4	0	Fowler, also Fields	Page	
31	2	0	J. W. Sanborn	......	
32	4	0	Own milk and cream	......	
33	5	0	Cilley	......	
34	3	0	J. W. Abbott	Putnam once a week	
35	4	0	Own milk and cream	......	
36	3	0	Cilley	......	
37	2	0	Cilley	......	
38	4	0	J. W. Sanborn	Putnam	
39	3	0	Sargent	......	
40	3	0	Barnard & Dunn	......	
41	3	3	Brown	Putnam	
42	3	0	Buckley	......	
43	6	0	Kimball	Mrs. Hill	
44	3	0	Fowler	Chamberlain	
45	3	1	Worchester	......	Patient, an engineer ate away from home very often.
46	2	0	Fowler	......	
47	1	0	Tarlton	......	
48	20	0	Abbott, also Field	Putnam's cream now and then	Boarding-house.
49	5	0	Annis	Putnam sometimes	
50	5	2	W. H. Chamberlain	......	Mr. C. ate at restaurant. Child had it after father recovered.

This table corresponds to Fig. 2.

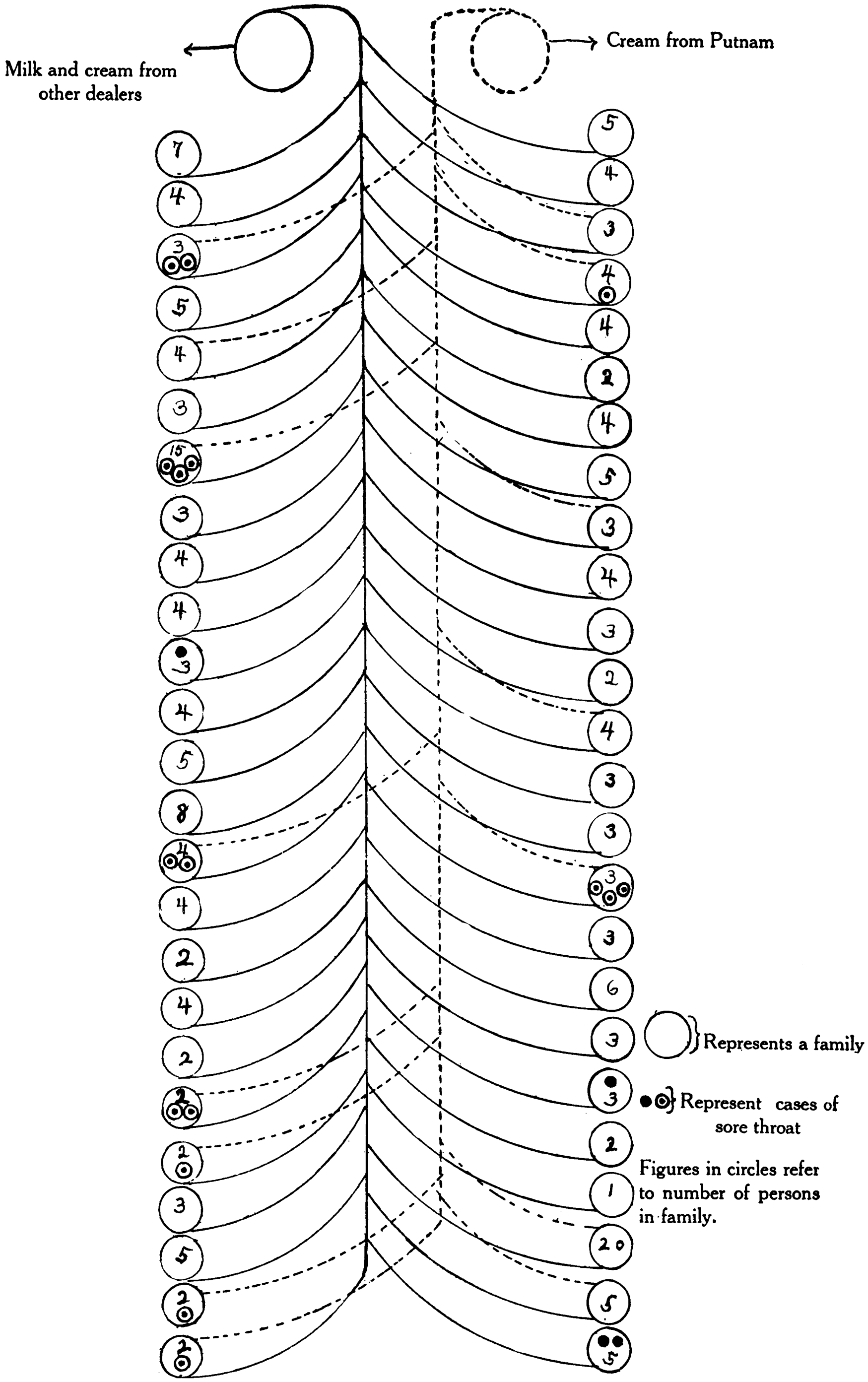

Milk and cream from other dealers
Cream from Putnam
Represents a family
Represent cases of sore throat
Figures in circles refer to number of persons in family.

FIG. 2.—A graphic representation of 50 families taken at random in the city showing a close relation between the cream supply and the disease.

The disease.—The disease corresponds to the description found in the text books on pseudodiphtheria; Holt classifies under this head, all inflammations of the throat and upper air passage characterized by the production of a false membrane in which the Klebs-Loeffler bacillus is not found. The term "septic sore throat" seems to be a good name for the disease and is now generally used.

Etiology.—The outbreak was general throughout the city. Eighty-two per cent of the cases occurred among the users of milk and cream from one dairy. It is probable that some cases classified with other dealers also used cream from this dairy since ice cream and milk served in a few drug stores came from the suspected dealer. Unfortunately the writer could not get records bearing on the relation of ice cream and the disease, since most of the families that used ice cream also used the raw cream. In one family, where four were attacked practically at the same time, cream from the suspected dairy had been purchased a day or two before the sickness and was put in the sherbet. Particular attention was paid to this family, and the housewife stated that not all of the sherbet had been used when the first person was taken ill. The disease as a rule affected the better classes, which is interesting because it shows the relation to the users of cream. In one apparently very poor family, where four out of six were attacked about the same time, the milk supply was from one single cow. When questioned about buying cream, they said they "never bought cream." Upon further inquiry it was found that the mother worked where cream and milk from the suspected dairy was used, and that she habitually brought cream and milk to the children and to the bed-ridden grandmother. The two not affected, one a man and the other a nursing child, did not use any milk or cream.

The disease was probably due to a form of streptococcus. Unfortunately no exhaustive study of the organism causing the disease was made. The writer's investigations began too late to enable him to make a satisfactory bacteriological study of the trouble. Dr. Duncan, state bacteriologist for New Hampshire, examined more than 100 cultures. He told the writer that in his opinion the disease was due to a streptococcus. His observations were made in a routine examination of swabs sent into the laboratory for diagnosis. Smears from two cases were examined by the writer and a streptococcus morphologically similar to the one described by Davis,[1] in the Chicago outbreak, was found.

The descriptions of the disease as furnished by the physicians of Concord, for the most part, were similar and were about as follows: "Follicular tonsilitis with marked swelling of the cervical glands. The tonsils are highly inflamed with dirty whitish dots over the crypts. Then follows the swelling of the cervical glands.

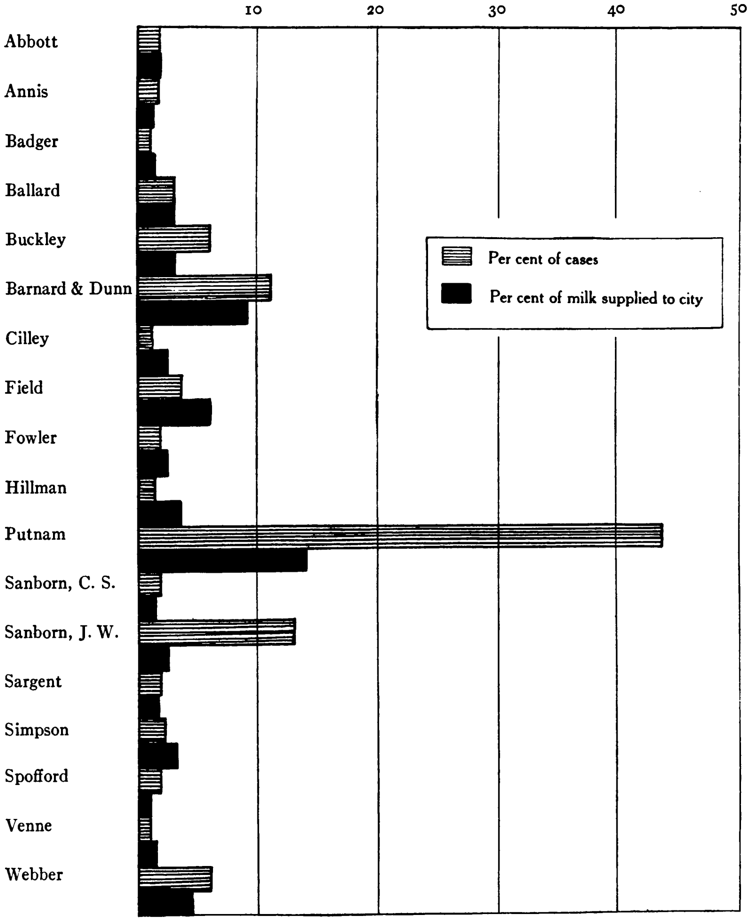


CHART 2.—Showing distribution of 110 cases that used a single milk supply exclusively.

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[1] *Jour. Am. Med. Assn.*, 1912, 58, p. 1852.

Suppuration may follow." "In nearly all, first symptoms, tenderness of glands, submaxillary and postcervical. Swelling of the same. Then comes complaint of difficulty of swallowing, sore throat, pharynx red and swollen; tonsils also. Relapses were common and in cases persistent. Many cases better in a few days, then relapsed." "Fever—'Grippe pains' in about 25 per cent of the cases. Tonsilitis in about 50 per cent. Enlarged submaxillary glands in 50 per cent." Four deaths were recorded.

The summary of answers by ten physicians regarding complications showed the following:

Cases complicated with erysipelas	7
" " " pneumonia	1
" " " tonsillar abscess	6
" " " external abscess	4
" " " otitis media	8

This probably includes about 300 cases.

Age.—The relation of age shows that young children were not affected as much as grown persons. Of 249 cases not including the boys and girls at St. Paul's and St. Mary's, the ages were as follows:

Under five	20
Between five and twenty	24
Between twenty and thirty	104
Between thirty and fifty	55
Over fifty	46

The children attacked, however, gave history in most cases of using the suspected cream. The cream was used generally in two ways, whipped for desserts, and on cereals.

TABLE 5.

NUMBER OF PERSONS IN FAMILY AND NUMBER AFFECTED IN EACH.

No. in Family	No. of Families	No. Sick
2	19	24
3	34	60
4	27	47
5	17	49
6	20	57
7	3	8
11	1	2

Average number in each family sick, 2.
Average number in each family, 3. 5.

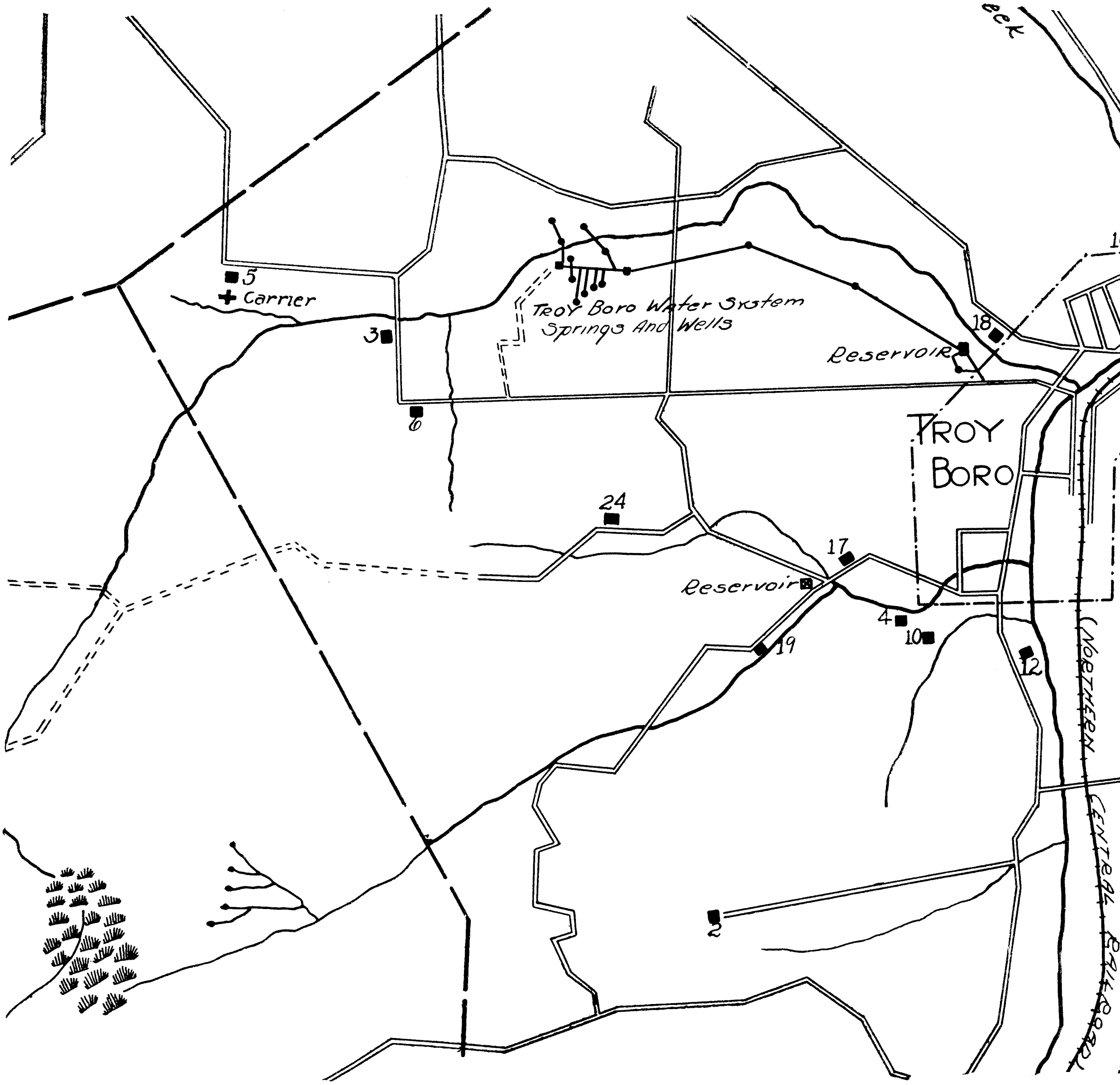
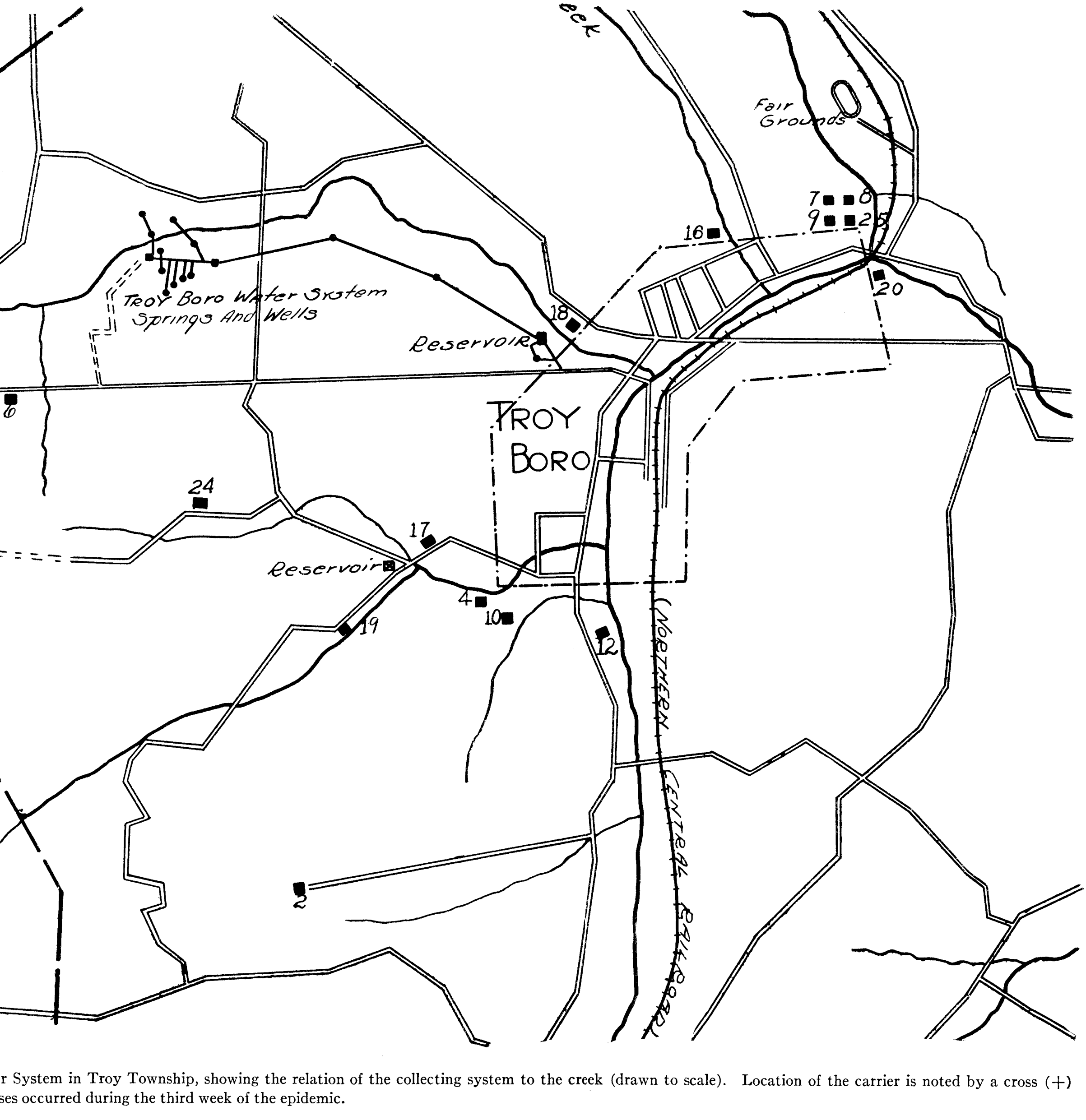


Fig. 1.—Troy Borough and Troy Borough Water System in Troy Township, showing the relation of the collecting system to the creek (drawn to s
on the banks of Spring Run. Case 5 in the same premises occurred during the third week of the epidemic.



r System in Troy Township, showing the relation of the collecting system to the creek (drawn to scale). Location of the carrier is noted by a cross (+)
ses occurred during the third week of the epidemic.

Sex.—Of 427 cases studied in regard to sex including 128 boys at St. Paul's and 25 girls at St. Mary's Schools, there were 240 males and 187 females.

Not including these schools there were males, 119; and females, 162.

CONCLUSIONS.

The epidemic of "septic sore throat" in Concord, New Hampshire, in January, 1912, was spread by means of infected *cream and milk:* the milk became infected through the handling by persons suffering with the disease, and the cream when separated from the milk retained the infecting organisms.

The standards of intelligence among milk producers are too low, and the public should demand that the producers have an elementary knowledge of bacteriology, or at least be able to recognize the importance of safeguarding milk against bacterial contamination.

Under the present standards, it is not safe to use market milk in the raw state and efficient pasteurization should be insisted upon in all cases where vending is engaged in.

It is just as important to safeguard the cream supply as the milk supply.

I wish to thank Dr. M. J. Rosenau of Harvard, for making it possible for me to undertake this epidemiological study; also the trustees of the Bach fund for an appropriation of $100 for scientific research, and Dr. A. H. Rose, dairy inspector for Massachusetts, whom I accompanied on many trips to dairy farms around Concord, for his advice and aid.

I wish also to thank the local and state health departments of Concord, New Hampshire, for allowing the use of their offices, and the physicians of Concord, whose co-operation made it possible to gather the necessary data. To Dr. B. F. Arms and A. I. Kendall I express appreciation for laboratory aid.